ISSN 0704-3716

Canadian Translation of Fisheries and Aquatic Sciences

No. 5253

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Original title: Mekanisert ising og sortering av industrifisk

In: Fiskets Gang Volume 66(14): 395-396, 1983

Original language: Norwegian

Available from:
Canada Institute for Scientific and Technical Information
National Research Council
Ottawa, Ontario, Canada K1A 0S2

1986

5 typescript pages

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2380014	Norwegian	LT	

Fiskets Gang, Vol. 69, No. 14, 1983
Pp. 395 - 396

MECHANIZED ICING AND SORTING OF INDUSTRIAL FISH

Per Inge Hjertaker

The installation that has been tested onboard M/S TONNY has proven to give very good dosage and distribution of ice with a minimum input of work. Captain Arnold Sirevaag has only positive things to say about the machine, which lacks, however, a satisfactory solution for ice pro - duction. - The ice machine that is planned to be installed onboard, has not been used earlier in industrial trawling in Northern Europe. However, French trawlers have favorable experiences with the machine. - The article below describes the mechanized sorting machine installed on M/S TONNY and surveys the ice machine for which Captain Sirevaag hopes to get economic aid.

The main component of the sorting machine is a receiving box with a conveyor leading to a sorting drum which separates the food fish and removes it from the system, sending it to its own receiving bins.

Further, the sorting machine has an ice elevator which brings ice from the ice bin to the machine and another elevator with a revolving downpipe for distributing the iced industrial fish to different bins or holds.

As the sketch (Fig. 1) shows, fish is lifted up to the receiving box on the deck, and the biggest fish, together with bigger stones and ropes, are held

back by the coarse grating in the box. The conveyor leads the fish at an even adjustable rate from the receiving box to the sorting drum. The drum separates all food fish over a given, adjustable size. The food fish is discharged from the end of the drum, to be skidded through two openings in the deck to two food-fish cleaning lines under the deck. The small industrial fish drop through the grating of the sorting drum onto a spiral conveyor which takes the fish to an elevator for iced fish. The outlet end of the spiral conveyor is constructed so that the last 30 - 40 cm function as a combined mixer and conveyor. The ice elevator discharges the ice from the ice bin here and mixes it well with the fish before the fish enters the iced-fish elevator. The elevator lifts the fish up to the revolving downpipe for distribution to the different holds.

The icing and sorting machine on M/S TONNY is on the deck on the after side of the cargo hold, and about 50 m^3 of the central hold has been converted to ice bins by constructing new bulkheads.The necessary ice bins were made by constructing a bulkhead right across the central hold, and by making another longitudinal bulkhead, a narrow space was created for the ice elevator. The longitudinal bulkhead was provided with three hatches through which the ice can be put in the elevator when it is lowered to the deck. The removal of some of the ice from the bin requires manual work. After the ice is consumed, the ice bin can be used as a hold for the last catches. All elevators and the sorting drum are hydraulically operated by a central unit.

The fish/ice ratio in the mixture can be regu . . . (Translator's note : line(s) missing in the text) . . . on the feeding-out conveyor from the receiving box, the rest of the machine, that is, the ice elevator and the drum, will adjust proportionally so that the ice/fish mixing ratio keeps constant regardless of the capacity at which the machine is operated.

Freshwater- and ice machine

Experience shows that the Danish fishermen have obtained improved profitability by installing mechanical icing and sorting facilities. If we are to gain the same type of improvements for the Norwegian fishermen, we have to have comparable conditions, e.g. :

1. Receiving capacity on land and price for food fish landed must be satisfactory.
2. Ice costs must be comparable with the Danish ice prices, i.e., about Kr. 60 per ton.
3. Price subsidies for industrial raw material of high quality must be satisfactory.

The most conspicuous difference seems to be the ice price. At present, the south Norwegian trawlers must pay about Nkr. 120 - 130 per t. Furthermore, ice-delivery capacity is low in southern Norway. Should icing of industrial fish really be introduced, it would require a significant increase of ice-production capacity. The simplest solution would be to have ice machines onboard. A calculation concerning the possible ice prices was carried out on the basis of information about an ice machine that is extensively used onboard fishing vessels in France. The result showed that an annual ice consumption of 1 500 t, corresponding to about 10 000 t industrial fish, and having an investment subsidy of 35 %, would give an ice price of Nkr. 58 per t. This includes energy costs, depreciation, interests, maintenance, and labor costs.

The calculation is based on a facility that today costs about Nkr 219 000 for a 5 t/day ice generator complemented with compressor, and Nkr 156 000 for a 7 m^3/day freshwater generator.

For the trial installation planned for M/S TONNY, the calculation also includes a week's observation onboard by the supplier, to secure a correct operation. Thus, assembly and follow-up amount to Nkr 136 000. As the vessel has a sufficient tank capacity onboard to transport the freshwater required for the ice production, the freshwater generator could be actually omitted, or possibly, a smaller and more reasonable model could be chosen (3.5 t/day), since some of the water could be brought from land.

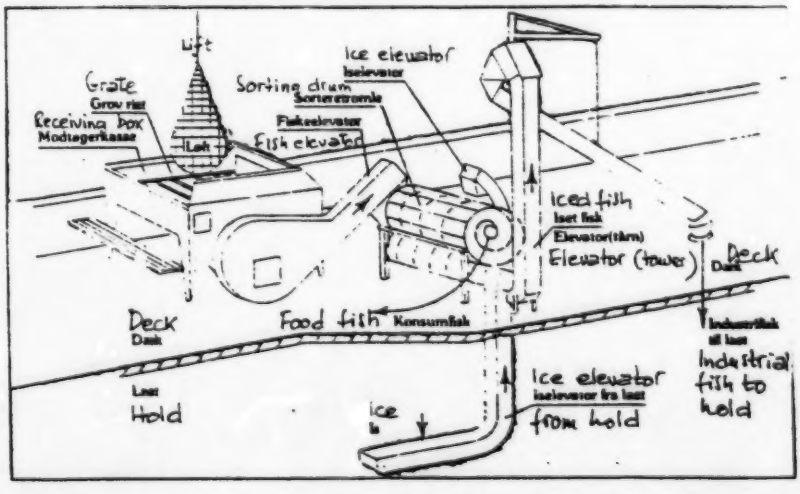
The ice generator selected operates under vacuum with an evaporation temperature of about 40°. Thus, calcium deposits on the heating surfaces are avoided, which makes the machine practically maintenance-free. All parts that come in contact with seawater are stainless steel, and the machine has no movable components exposed to wear, except three water pumps. The machine is operated by waste heat from the main engine.

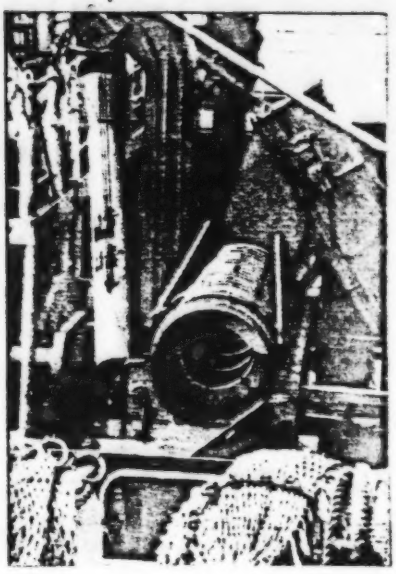
The most suitable place for the freshwater generator is the engine room. It has a cylindrical container about 1.6 m long, with a diameter of 0.5 m.

The ice generator is specially designed to operate onboard fishing vessels. The model is protected against salt corrosion and it is not affected by the vessel's movements. The machine produce undercooled flaky ice which is assumed to be well suited for icing industrial fish.

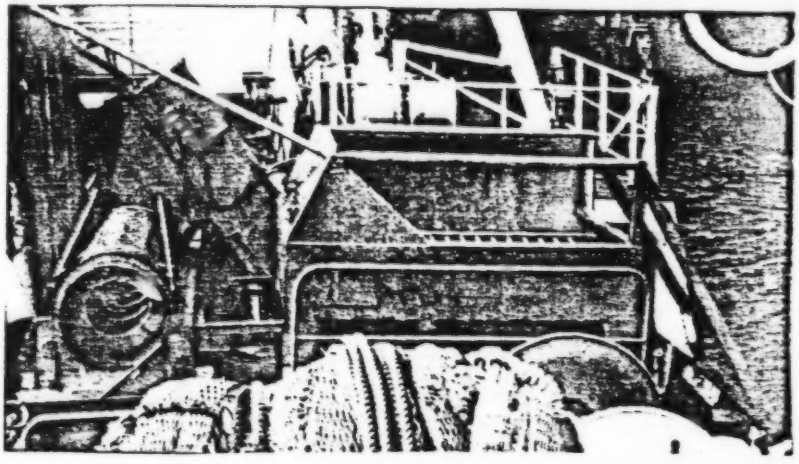
The ice machine, compressor, condensator, and control box are delivered in a frame requiring a space of about 1.3 m^2 x 1.3 m^2 . The unit is about 1.25 m high and weighs 550 kg. It is most suitably placed above the ice bin.

Fig. 1 A sketch of the sorting and icing machine that has operated onboard onboard M/S TONNY since April 1983.

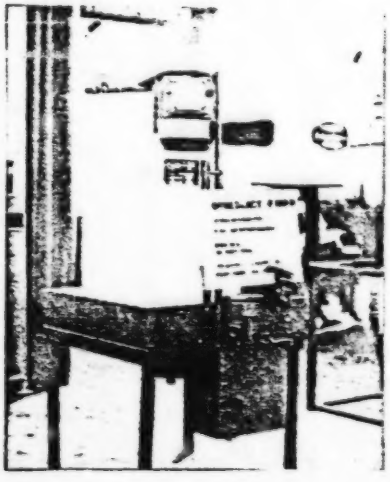




The sorting drum discharges food fish from the opening in the centre of the photo. The smaller industrial fish fall through the grating of the drum. A spiral conveyor underneath takes the fish to the pipe on the right, where it is mixed with ice, to be then conveyed down to the hold.



The receiving box is seen on the right. The angled conveyor takes the fish in an even stream to the sorting drum on the left.



The ice machine to be installed on M/S TONNY may not be very large but can produce more than 5 t of ice each day.